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## A survey of hawaii optometrists: The optometric use of pharmaceutical agents

Walter M. Yamaoto  
*Pacific University*

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## A survey of hawaii optometrists: The optometric use of pharmaceutical agents

### Abstract

A mail survey was conducted on practicing optometrists in the state of Hawaii for their views on the optometric use of diagnostic pharmaceutical agents (DPA) and therapeutic pharmaceutical agents (TPA). Of ninety-eight questionnaires mailed, four were invalidated and seventy of the remaining ninety-four (74.5%) were completed and returned. Results indicated that 97.1% of the optometrists, significantly more than half, favored the use of DPA while 37.1%, significantly less than half, favored the use of TPA. Preferences for DPA and TPA use were unrelated to the optometrists' mode of practice and professional school attended. The optometrists with fewer years in practice tended to favor DPA and TPA use more than those with more years in practice, but not significantly so. 97.1% of the optometrists performed tonometry on their patients and 64.3% had taken a course in pharmacology.

### Degree Type

Thesis

### Degree Name

Master of Science in Vision Science

### Committee Chair

Susan Baillet

### Subject Categories

Optometry

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A Survey of Hawaii Optometrists:  
The Optometric Use of Pharmaceutical Agents

Walter M. Yamamoto  
Pacific University College of Optometry

Susan Baillet, Ph.D.  
Adviser

February 1982

Pharma  
Optometry  
Hawaii

## ABSTRACT

A mail survey was conducted on practicing optometrists in the state of Hawaii for their views on the optometric use of diagnostic pharmaceutical agents (DPA) and therapeutic pharmaceutical agents (TPA). Of ninety-eight questionnaires mailed, four were invalidated and seventy of the remaining ninety-four (74.5%) were completed and returned. Results indicated that 97.1% of the optometrists, significantly more than half, favored the use of DPA while 37.1%, significantly less than half, favored the use of TPA. Preferences for DPA and TPA use were unrelated to the optometrists' mode of practice and professional school attended. The optometrists with fewer years in practice tended to favor DPA and TPA use more than those with more years in practice, but not significantly so. 97.1% of the optometrists performed tonometry on their patients and 64.3% had taken a course in pharmacology.

## INTRODUCTION

The optometric profession in the United States has undergone considerable changes since 1901 when Minnesota enacted the first state optometric law.<sup>1</sup> While optometrists in other countries had already been using pharmaceutical agents, optometrists in this country have only recently been authorized to do so.<sup>2</sup> To date, optometrists in thirty-four states have been permitted to use pharmaceutical agents for diagnostic use, while those in two states have also been permitted to use them for therapeutic purposes.<sup>3</sup> (Appendix A)

This change has intensified the rivalry between elements of the optometric and ophthalmological professions. Although these two professions were nearly merged into one in 1897 by the physicist, Charles F. Prentice, they have remained as two distinct providers of eye care.<sup>4</sup>

The history of this rivalry is beyond the scope of this paper. However, this rivalry has largely been based upon competition in the areas of economics and ego.<sup>5,6</sup> Since many of the visual refracting services can be provided by both optometrists and ophthalmologists, there has been economic competition for patients requiring eye care. One ophthalmologist estimates that the "average ophthalmologist spends between eighty and eighty-five percent of his time

doing refractions and fitting of contact lenses."<sup>5</sup> These have been two primary services offered in an optometric office. Ophthalmologists have felt that since they can provide medical care for pathology, they alone can provide "complete eye care," whereas optometrists must refer patients with pathology to physicians and must therefore provide only "incomplete eye care."<sup>1</sup> Because of that distinction, ophthalmologists have felt that they must belong at the top of any hierarchy in the eye care field.<sup>1,7</sup> The use of pharmaceutical agents by optometrists has been viewed by many ophthalmologists as an encroachment upon the practice of medicine.<sup>8</sup>

Optometrists have worked to gain respectability as health care providers. However, the development of the optometric profession has continually been met with resistance by the medical profession. Medical opposition has been voiced to such issues as the enactment of state optometric laws and the granting of the Doctor of Optometry (O.D.) degree. Criticizing optometry's professional curriculum, medicine had, in the past, made it "unethical" for physicians to teach or to lecture to optometrists.<sup>9</sup> Mindful of this criticism, the optometric profession has upgraded its professional curriculum so that the mean post-secondary education of optometry graduates has increased from two years in 1910 to eight years in the 1970's.<sup>9</sup> Yet, as one optometric educator notes, "Continual ophthalmological harassment that optometry is deficient in certain curriculum areas only applies pressure to

model optometry closer to ophthalmology and thus cause more conflict between the two professions."<sup>9</sup>

Opinion within each profession concerning the optometric use of pharmaceutical agents has not been unanimous. Some ophthalmologists, as well as some optometrists, have supported the optometric use of pharmaceutical agents for diagnostic purposes, but not for therapeutic purposes.<sup>5</sup> Other optometrists have opposed any use of pharmaceutical agents in the practice of optometry because of optometry's heritage as a "drug-free" profession.<sup>10</sup> A trustee of the American Optometric Association writes:

In the final analysis, the choice regarding the use of pharmaceutical agents is a personal one. What is important is that every practitioner should have available for his use every proven diagnostic aid so that the patient will receive the benefit of complete diagnoses, treatment and referral when necessary and at the least cost to the patient.<sup>11</sup>

Optometrists in the state of Hawaii are not authorized to use pharmaceutical agents in their practices. Optometry's efforts to enact legislation for the use of diagnostic pharmaceutical agents (DPA) has been met with stiff ophthalmologic opposition. As one who intends to practice in the state of Hawaii, this researcher surveyed practicing optometrists there to assess the level of support for DPA use and for therapeutic pharmaceutical agents (TPA) use. Analysis of the data collected included correlation of preferences for DPA and TPA use with the optometrists' mode of practice, years in practice, and the professional school attended. If



any correlation were to be demonstrated, it was expected that those practitioners with fewer years in practice would be more likely to favor DPA and TPA use. It was further expected that support for DPA use would be greater than for TPA use, paralleling the national surveys conducted by the Review of Optometry where 85% of the optometrists favored DPA use and between 49% and 56% favored TPA use.<sup>12,13,14</sup>

#### METHOD

A cover letter (Appendix B) and the questionnaire (Appendix C) were mailed to ninety-eight practicing optometrists in the state of Hawaii in the fall of 1981. Names and addresses were obtained from the most current editions of the Blue Book of Optometry (1980), the Oahu Directory of the Hawaiian Telephone Company (dated February 1, 1981), and from personal knowledge. A self-addressed, stamped envelope was also provided. An early reply date was requested to encourage an immediate response. A follow-up post card (Appendix D) was prepared and was mailed to non-responders three days after the requested reply date.

The questions were modeled after those used in the Review of Optometry surveys. In order to finalize the form of the questionnaire, a pilot study was conducted on optometry students from Hawaii who were attending the Pacific University College of Optometry.

A letter summarizing the results of the survey (Appendix E) was sent to each respondent who had requested a copy.

## RESULTS

Of the ninety-eight questionnaires mailed, two were returned by the U.S. Postal Corporation, one optometrist was retired, and one was "undecided" on the issue. Seventy of the remaining ninety-four questionnaires (74.5%) were received and tabulated (Figure 1).

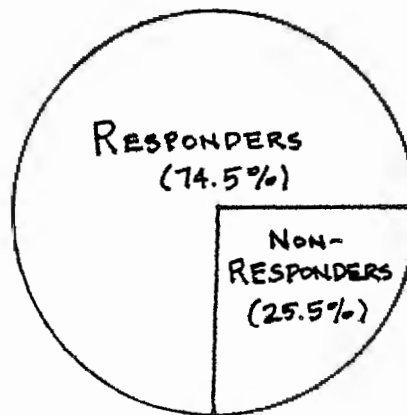


Figure 1: Survey Response

Figures 2, 3, and 4 represent the profile of the seventy optometrists who responded, illustrating the modes of practice, years in practice, and the professional schools attended, respectively.

More optometrists (97.1%) favored DPA use than opposed their use (2.9%),  $\chi^2(1) = 62.2$ ,  $p < .05$  (Figure 5). Conversely, more optometrists (62.9%) opposed TPA use than favored their use (37.1%),  $\chi^2(1) = 4.6$ ,  $p < .05$  (Figure 6) (Appendix F).

Chi-square analysis (Appendix G) indicated that modes

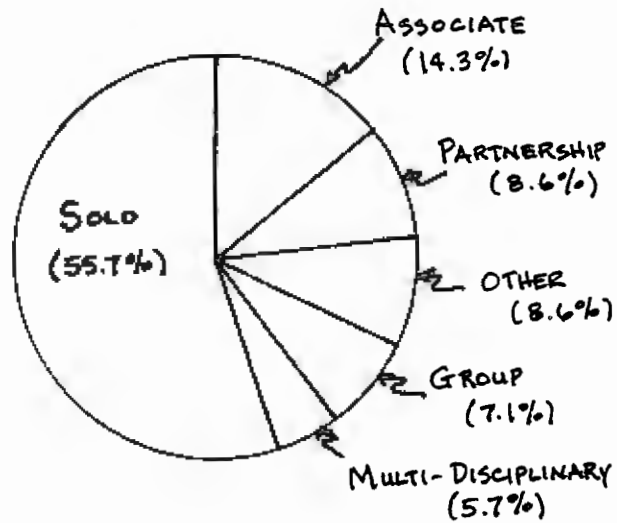


Figure 2: Profile: Modes of Practice

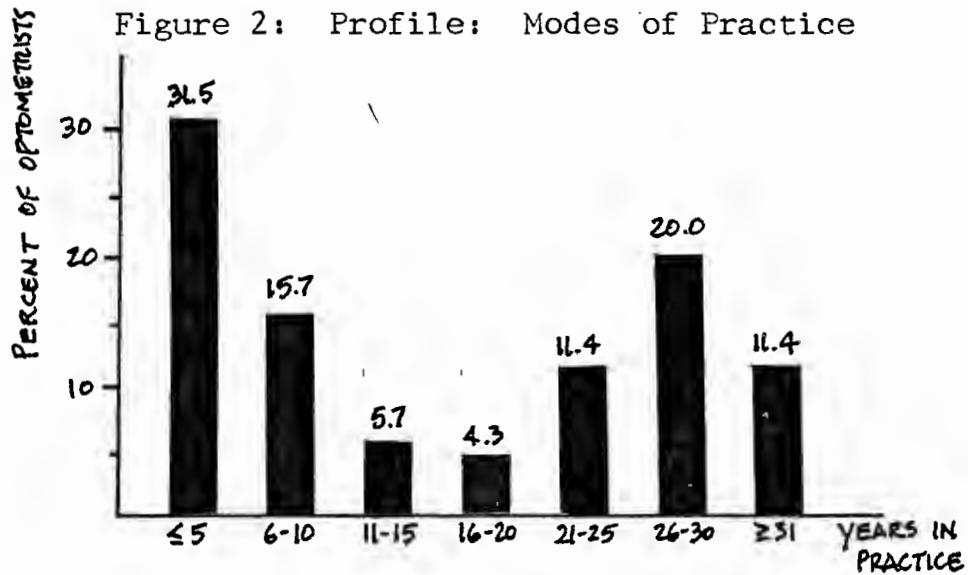


Figure 3: Profile: Years in Practice

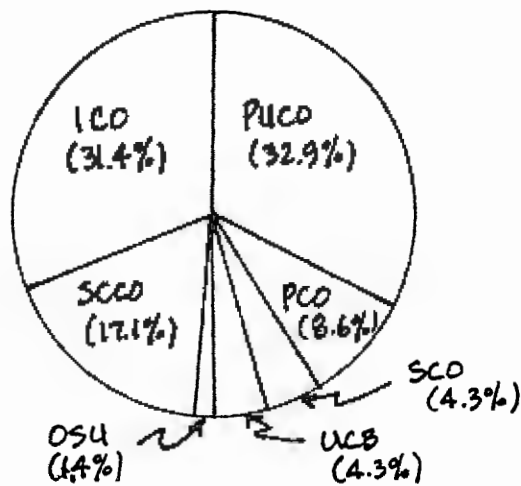


Figure 4: Profile: Professional School Attended\*  
 (\* See page 25 for school codes)

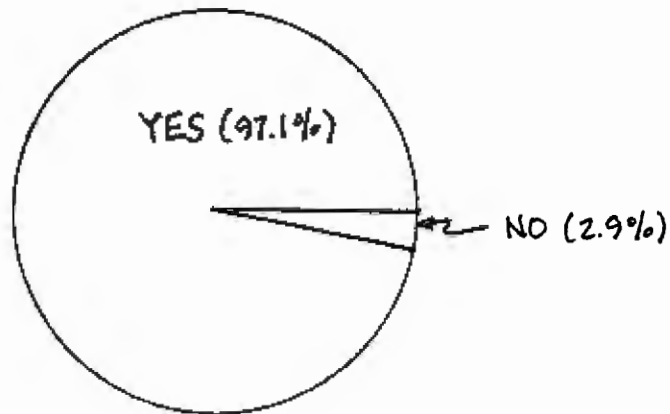


Figure 5: DPA Use

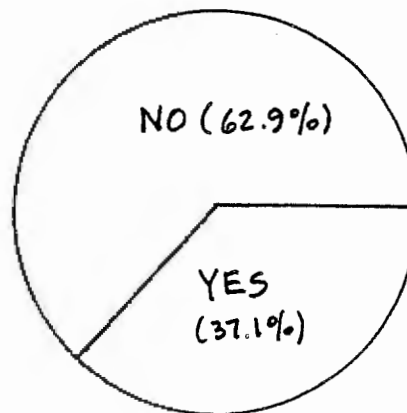


Figure 6: TPA Use

of practice and professional school attended were unrelated to preferences for DPA and TPA use. Optometrists in a particular mode of practice or who were graduates of a particular professional school did not tend to significantly favor DPA and TPA use more than others in different modes of practice or who were graduates from other professional schools. Point biserial analysis (Appendix H) indicated small negative correlations between years in practice and DPA use ( $r = -0.14$ ) and TPA use ( $r = -0.13$ ). This meant that those optometrists with fewer years in practice tended to favor

DPA and TPA use more than those with more years in practice, although not significantly so.

Sixty-eight of the optometrists (97.1%) indicated that tonometry was being performed on their patients. Thirty-six (51.4%) indicated that all patients were being screened, while thirty-two (45.7%) indicated that patients over a specified age, usually over the age of forty, were being screened (Figure 7). Numerous responses added that clinical indications, rather than age alone, were the deciding factor for screening patients.

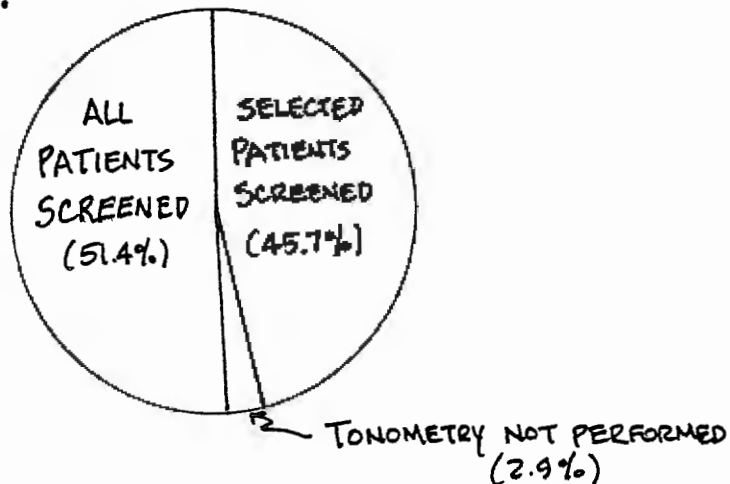


Figure 7: Tonometry

Forty-five of the optometrists (64.3%) indicated that a course in pharmacology had been taken, either in optometry school or later (Figure 8).

Figure 9 illustrates the percentage of optometrists who, if permitted to do so, would use DPA for the patient age groups of 1-5, 6-10, 11-20, 21-40, 41 or more, or who would not use DPA. Table 1 lists those percentages categorized further into the approximate level of use in each age group.

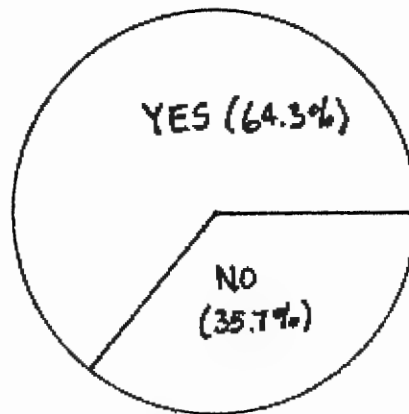


Figure 8: Pharmacology Course Taken

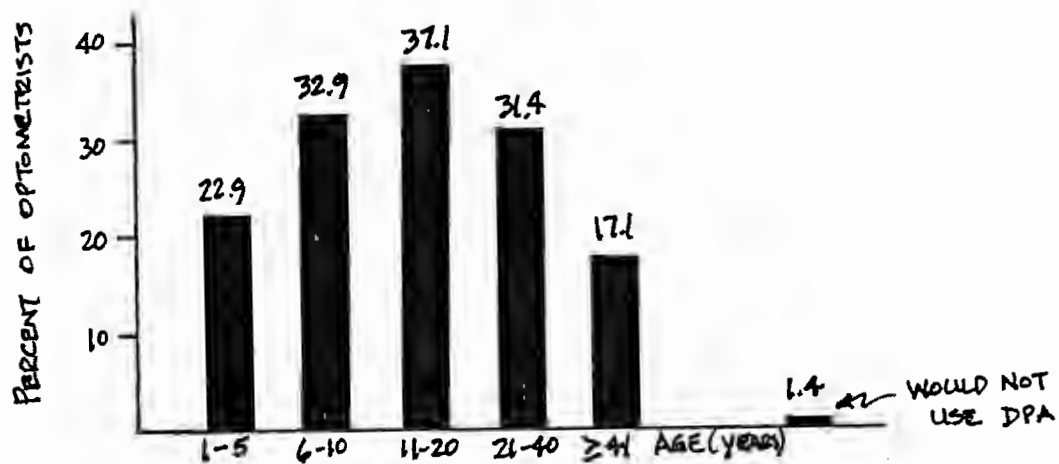


Figure 9: DPA Use for Patient Age Groups

Figure 10 illustrates the percentage of the optometrists who, if permitted to do so, would use DPA for refraction, tonometry, gonioscopy, fundus examination, electrodiagnosis, or other procedures (lenticular examination or contact lens fitting).

Figure 11 illustrates the percentage of the optometrists who, if permitted to do so, would use TPA to treat conjunctivitis, blepharitis, keratitis, iritis, glaucoma, or other ocular pathology, or who would not use TPA.

Table 1: Level of DPA Use for Patient Age Groups  
(Percentage of Optometrists)

Level of DPA Use (%)	Age Groups (Years)				
	1-5	6-10	11-20	21-40	>40
91-100	4.3	2.9	4.3	5.7	8.6
81-90	1.4	1.4	2.9	2.9	7.1
71-80	8.6	4.3	0	1.4	7.1
61-70	0	1.4	0	0	2.9
51-60	1.4	0	1.4	1.4	7.1
41-50	10.0	2.9	2.9	2.9	18.6
31-40	0	0	0	1.4	1.4
21-30	7.1	10.0	2.9	10.0	8.6
11-20	5.7	7.1	7.1	7.1	5.7
1-10	24.3	34.3	40.0	34.3	11.4
Would not use DPA: 1.4					

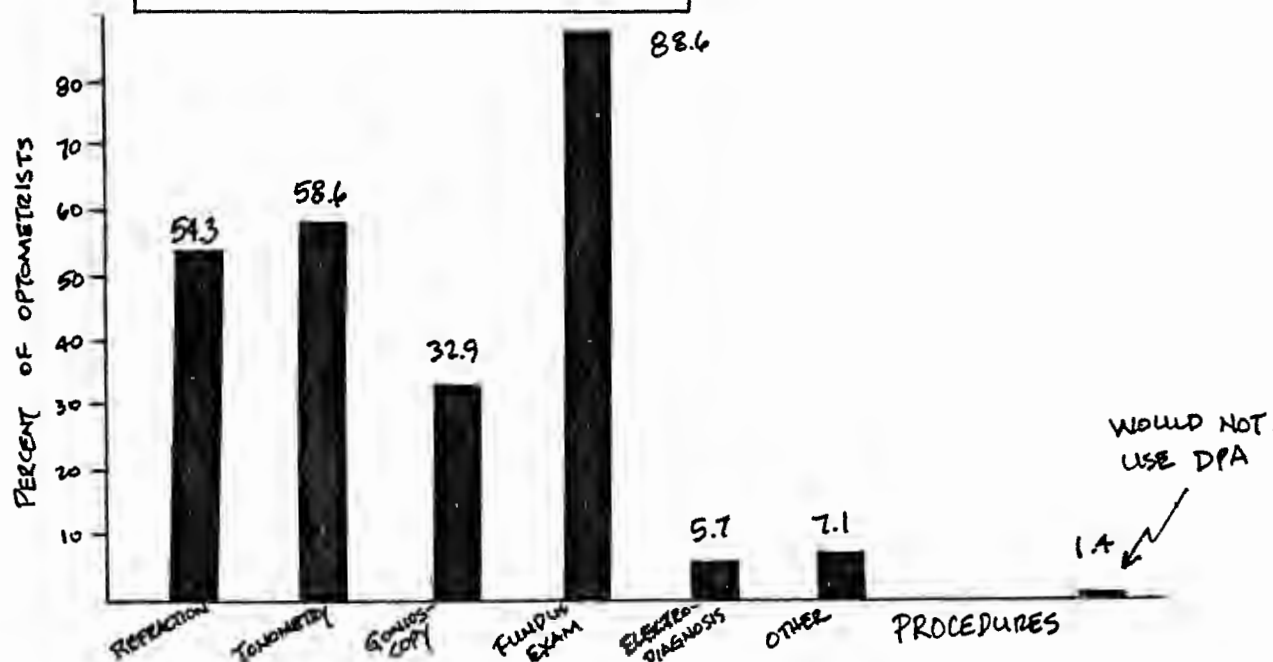


Figure 10: DPA Use for Optometric Procedures

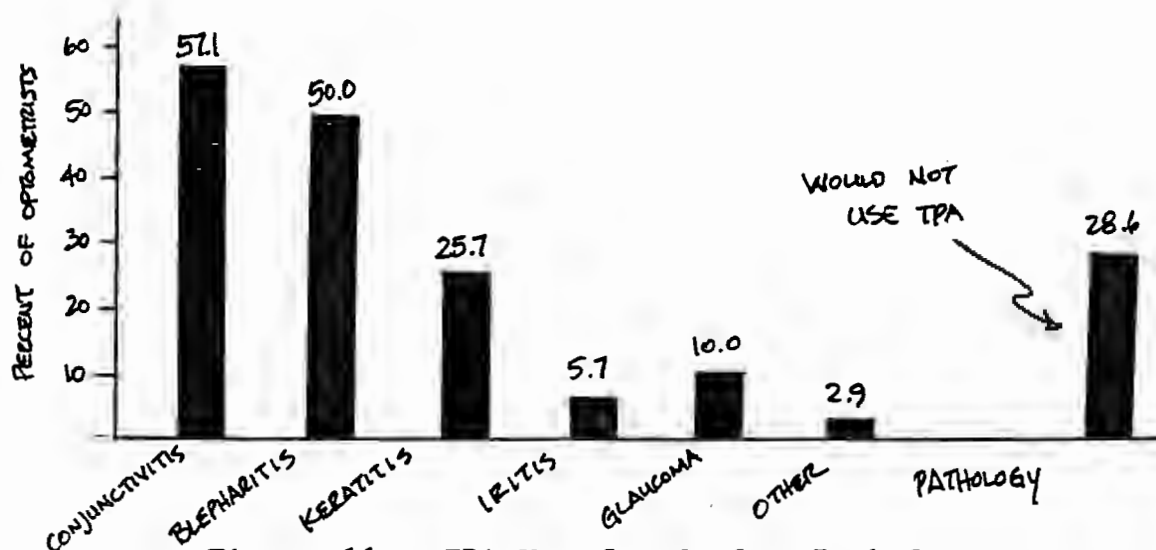


Figure 11: TPA Use for Ocular Pathology

### DISCUSSION

The data collected demonstrated strong support for the optometric use of pharmaceutical agents for diagnostic purposes. This support was even greater than those seen in the surveys conducted by the Review of Optometry. If this is an indication of the commitment of optometrists in Hawaii to pursue the enactment of legislation for DPA use, the likelihood of attaining that objective appears to be favorable.

Support for the therapeutic use of pharmaceutical agents by optometrists was not demonstrated. This may be a reflection of the strong ophthalmological opposition in Hawaii and may counter the argument that optometric support for DPA legislation may be merely a steppingstone for eventual TPA legislation.

This survey involved only members of the optometric profession. Surveys conducted on members of the Hawaii legislature would provide a more accurate barometer on the like-



likelihood of the successful enactment of DPA legislation. Other surveys which would be of interest on the subject would be those conducted on the general public since consumer concerns are at issue, or those conducted on members of the medical profession, including the ophthalmology specialty.

One of the problems encountered in the conduct of this survey was to elicit a concise answer on the DPA and TPA questions while allowing the optometrists to express themselves more fully. A "why or why not" question was therefore included after the "yes or no" portion. It revealed that while twenty-six responses indicated support for TPA use, seventeen of those twenty-six had indicated some restrictions to their support, such as limiting treatments to "minor conjunctivitis" or to "anterior segment pathology."

Another problem encountered was that some of the categories listed for the "mode of practice" were not necessarily mutually exclusive. Optometrists in the military, for example, could list themselves under "multi-disciplinary" or "other - military." Several optometrists had incorporated their practices and listed themselves under "other - professional corporation." As a result, the breakdown of modes of practices was not precise.

Since some questionnaires were not answered completely, responses to some questions did not sum up to the total number of questionnaires returned for tabulation. Specifically, the questions on age groups, optometric procedures, and pathologies were sometimes left unanswered. The percentage of

responses reported therefore did not add to 100% in those instances.

A mail survey was necessitated because of this researcher's absence from the state of Hawaii. Although personal interviewing was not possible, the mail survey enabled the simultaneous gathering of data by uniform and objective means. The high participation rate seen in this mail survey was probably due to the great interest in the DPA and TPA issues by the optometrists who responded.

In the pilot study conducted on optometry students at the Pacific University College of Optometry, it was of interest to note that the students were evenly split on the TPA issue. Upon closer examination, however, the data revealed that first and second year students favored TPA use while third and fourth year students opposed their use. It is this researcher's opinion that this phenomenon was due to the fact that the first and second year students were not knowledgeable of some of the optometric procedures involved and the implications of the optometric use of pharmaceutical agents. The courses in pharmacology and systemic pathology and most of the ocular pathology courses had not been taken by these students at the time the pilot study was conducted. It appears that the third and fourth year students who had more clinical knowledge and experience preferred not to be involved in the therapeutic aspects of pharmaceutical agents.

Overall, support for DPA use was strongly demonstrated in this survey, whereas support for TPA use was not. The

preferences shown were not related in any significant way to the modes of practice and professional schools attended by the responding optometrists. However, the optometrists with fewer years in practice tended to favor DPA and TPA use more than those with more years in practice, although not significantly so.

## REFERENCES

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10. Newell, JD: Letter to the editor. Rev Opt 116(7): 16, Jul 1979.
11. Bucar, AA: Pharmaceutical agents. J Am Opt Assn 51(4): 355-356, Apr 1980.
12. Panel report: Drugs: where will they lead? Rev Opt 112(18): 22-33, Sep 15, 1975.
13. Panel report: Optometry's red alert. Rev Opt 116(8): 75-77, Aug 1979.
14. Panel report: Taking aim on the issues. Rev Opt 116(5): 99-101, May 1979.

## APPENDIX

## APPENDIX A

## UTILIZATION OF PHARMACEUTICAL AGENTS BY OPTOMETRISTS

## 1. Authorized by Statute:

Arizona	Nevada
Arkansas	New Mexico
California	* North Carolina
Delaware	North Dakota
Georgia	Oklahoma
Idaho	Oregon
Iowa	Pennsylvania
Kansas	Rhode Island
Kentucky	South Dakota
Louisiana	Tennessee
Maine	Texas
Missouri	Utah
Montana	* West Virginia
Nebraska	Wisconsin
	Wyoming

## 2. Permitted by Opinion of Attorney General:

Florida  
Indiana  
New Jersey

## 3. No Statutory Prohibition:

Minnesota

## 4. No Statutory Prohibition But Negative Attorney General Opinion:

Alabama  
Virginia  
Michigan

Source: AOA News, September 1, 1981, page 7.

\* Optometrists permitted to use therapeutic pharmaceutical agents.

## APPENDIX B

1900 S.E. Quail Circle  
Hillsboro, OR 97123  
November 27, 1981

Dear Doctor:

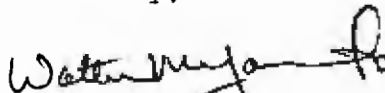
One of the more significant changes in the practice of optometry has been the use of pharmaceutical agents. To date, optometrists in thirty-four states are permitted to use them. Since Hawaii is not one of those states, it would be beneficial to survey Hawaii's optometrists on this subject. This may provide an indication of the direction of optometry in Hawaii in the future. I have designed a survey for this purpose as part of my research project which fulfills one of the graduation requirements from the Pacific University College of Optometry.

I would appreciate your taking a few minutes to complete the attached one-page questionnaire and to return it in the enclosed self-addressed, stamped envelope by December 5, 1981. Your responses will be kept confidential; the return envelopes are coded for follow-up purposes only and will be separated from your responses when received.

If you would like to receive a summary of the results of this survey, please circle the code on the return envelope.

Thank you for your cooperation.

Sincerely,



Walter M. Kamanoto  
Student  
Pacific University  
College of Optometry

WMY:mg

Enclosures

## QUESTIONNAIRE

## APPENDIX C

1. What is your mode of practice?

☐ Solo  
☐ Associate  
☐ Partnership

☐ Group  
☐ Multi-disciplinary  
☐ Other: \_\_\_\_\_

2. How long have you been in practice? \_\_\_\_\_ (years)

3. From which optometry school did you receive your professional degree?  
 \_\_\_\_\_ When? \_\_\_\_\_ (year)

4. Do you perform tonometry on your patients? Yes No  
 If you answer "Yes," do you generally perform this test on: .

☐ All patients  
☐ Only patients over age \_\_\_\_\_

5. Have you taken a course in pharmacology, either in optometry school or later? Yes No

6. Do you think optometrists should be permitted to use ocular diagnostic drugs in the practice of optometry? Yes No  
 Why or why not?

7. If you were permitted to do so, on approximately what percentage of each age group would you use ocular diagnostic drugs?

<input type="checkbox"/> Would not use at all	<input type="checkbox"/> % Age 11-20 years
<input type="checkbox"/> % Age 1-5 years	<input type="checkbox"/> % Age 21-40 years
<input type="checkbox"/> % Age 6-10 years	<input type="checkbox"/> % Age 41 years and up

8. If you were permitted to do so, during which procedures would you most likely use ocular diagnostic drugs? (You may check more than one procedure.)

<input type="checkbox"/> Refraction	<input type="checkbox"/> Fundus examination
<input type="checkbox"/> Tonometry	<input type="checkbox"/> Electrodiagnosis
<input type="checkbox"/> Gonioscopy	<input type="checkbox"/> Other: _____

9. Do you think optometrists should be permitted to use ocular therapeutic drugs in the practice of optometry? Yes No  
 Why or why not?

10. If you were permitted to do so, on which types of pathology would you be most likely to use ocular therapeutic drugs? (You may check more than one type.)

<input type="checkbox"/> Would not use at all	<input type="checkbox"/> Iritis
<input type="checkbox"/> Conjunctivitis	<input type="checkbox"/> Glaucoma
<input type="checkbox"/> Blepharitis	<input type="checkbox"/> Other: _____
<input type="checkbox"/> Keratitis	

Thank you for completing this questionnaire.



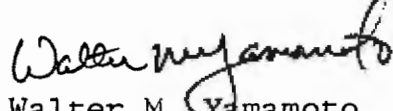
## APPENDIX D

## FOLLOW-UP POST CARD

Dear Doctor:

I recently mailed to you a questionnaire for my student research project on the optometric use of pharmaceutical agents. Would you please, if you have not already done so, take a few minutes to complete the questionnaire and return it in the stamped, self-addressed envelope which accompanied it?

Thank you for your cooperation.



Walter M. Yamamoto  
Student, Pacific University  
College of Optometry

## APPENDIX E

47-658-4 Hui Kelu Street  
Kaneohe, HI 96744  
January 18, 1982

Dear Doctor:

The following are the results of the survey on the optometric use of pharmaceutical agents in which you recently participated:

1. Of 98 questionnaires mailed to practicing optometrists in the state of Hawaii, 2 were returned by the U.S. Postal corporation, 1 optometrist was retired, and 1 optometrist was undecided on the issue. Of the remaining 94, 70 responses (74.5%) were received and tabulated for this survey.

2. Profile of the respondents (percent of responses):

a. Mode of practice:

Solo	55.7	Group	7.1
Associate	14.3	Multi-disciplinary	5.7
Partnership	8.6	Other (Professional corporation, military)	8.6

b. Years in practice:

5 or less	31.5	21-25	11.4
6-10	15.7	26-30	20.0
11-15	5.7	31 or more	11.4
16-20	4.3		

c. Professional school attended:\*

ICO	31.4	SCCO	17.1
OSU	1.4	SCO	4.3
PUCO	32.9	UCB	4.3
PCO	8.6		

3. 68 responses (97.1%) indicated that tonometry was being performed on their patients. 36 (51.4%) indicated that all patients were being screened, while 32 (45.7%) indicated that patients over a specified age were being screened. Numerous responses

\* ICO Illinois College of Optometry  
OSU Ohio State University College of Optometry  
PUCO Pacific University College of Optometry  
PCO Pennsylvania College of Optometry  
SCCO Southern California College of Optometry  
SCO Southern College of Optometry  
UCB University of California, Berkeley, School of Optometry

added that clinical indications were the key factor for screening rather than age alone.

4. 45 responses (64.3%) indicated that a course in pharmacology had been taken, either in optometry school or later.

5. 68 responses (97.1%) avored the optometric use of diagnostic pharmaceutical agents (DPA). 44 responses (62.9%) opposed the optometric use of therapeutic pharmaceutical agents (TPA). Each of these preferences were statistically significant ( $p < .05$ ). Of the 26 responses (37.1%) in favor of the optometric use of TPA, 17 had indicated some restriction upon their approval, such as limiting TPA use to "minor conjunctivitis" or "anterior segment pathology." Chi-square analysis indicated that preferences for DPA and TPA were independent of the respondents' mode of practice and professional school attended. Point biserial analysis indicated that a small negative correlation existed between years in practice and preference for DPA use ( $r = -0.14$ ) and for TPA use ( $r = -0.13$ ). None of these correlation data were statistically significant at the .05 level.

6. The respondents would, if permitted to use DPA:

a. Use on age groups (percent of responses):

Age 1-5	22.9	Age 21-40	31.4
Age 6-10	32.9	Age 41 or more	17.1
Age 11-20	37.1	Would not use DPA	1.4

b. Use for these procedures (percent of responses):

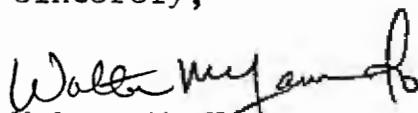
Refraction	54.3	Fundus examination	88.6
Tonometry	58.6	Electrodiagnosis	5.7
Gonioscopy	32.9	Other*	7.1

7. Respondents would, if permitted to use TPA, treat (percent of responses):

Conjunctivitis	57.1	Glaucoma	10.0
Blepharitis	50.0	Other**	2.9
Keratitis	25.7	Would not use TPA	28.6
Iritis	5.7		

If you have a question which this summary has not answered fully, please feel free to contact me at the address above. Thank you very much for your cooperation and interest.

Sincerely,

  
Walter M. Yamamoto  
Student, Pacific University  
College of Optometry

- \* Contact lens workup, fundus photo, lenticular examination  
\*\* Epithelium trauma, mild corneal injection

## APPENDIX F

## CHI-SQUARE ANALYSIS

Question: Do you think optometrists should be permitted to use ocular diagnostic drugs in the practice of optometry?

Yes	68
No	2

$$\underline{\underline{\chi^2 = 62.23}}$$

(Critical value = 3.84 for  $p = .05$ ,  
 $df = 1$ )

Question: Do you think optometrists should be permitted to use ocular therapeutic drugs in the practice of optometry?

Yes	26
No	44

$$\underline{\underline{\chi^2 = 4.63}}$$

(Critical value = 3.84 for  $p = .05$ ,  
 $df = 1$ )

APPENDIX G  
CHI-SQUARE ANALYSIS

1. DPA Use and Modes of Practice:

	SOLO	ASSOCIATE	PARTNER- SHIP	GROUP	MULTIDISCI- PLINARY	OTHER
YES	37	10	6	5	4	6
NO	2	0	0	0	0	0

$\chi^2 = 1.64$  (Critical value = 11.07 for  $p = .05$ ,  $df = 5$ )

2. TPA Use and Modes of Practice:

	SOLO	ASSOCIATE	PARTNER- SHIP	GROUP	MULTIDISCI- PLINARY	OTHER
YES	17	2	2	2	2	1
NO	22	8	4	3	2	5

$\chi^2 = 3.36$  (Critical value = 11.07 for  $p = .05$ ,  $df = 5$ )

3. DPA and Professional School:\*

	ICO	OSU	PUCO	PCO	SCCO	SCO	UCB
YES	20	1	23	6	12	3	3
NO	2	0	0	0	0	0	0

$\chi^2 = 4.49$  (Critical value = 12.59 for  $p = .05$ ,  $df = 6$ )

4. TPA and Professional School:\*

	ICO	OSU	PUCO	PCO	SCCO	SCO	UCB
YES	6	1	11	2	5	1	0
NO	16	0	12	4	7	2	3

$\chi^2 = 5.67$  (Critical value = 12.59 for  $p = .05$ ,  $df = 6$ )

## \* Professional Schools:

ICO	Illinois College of Optometry
OSU	Ohio State University College of Optometry
PUCO	Pacific University College of Optometry
PCO	Pennsylvania College of Optometry
SCCO	Southern California College of Optometry
SCO	Southern College of Optometry
UCB	University of California, Berkeley, School of Optometry

APPENDIX H  
POINT BISERIAL ANALYSIS

$$r_{pb} = \frac{N \sum Y_1 - N_1 \sum Y}{\sqrt{N_1 N_0 [N \sum Y^2 - (\sum Y)^2]}}$$

1. DPA Use and Years in Practice:

$$\begin{aligned} N &= 70 & \sum Y_1 &= 1057 \\ N_1 &= 68 & \sum Y &= 1109 \\ N_0 &= 2 & \sum Y^2 &= 28,673 \\ & & (\sum Y)^2 &= 1,229,881 \end{aligned}$$

$$\underline{\underline{r_{pb} = -0.14}} \quad (\text{Critical value} = 0.25 \text{ for } p = .05, \text{ df} = 68)$$

2. TPA Use and Years in Practice:

$$\begin{aligned} N &= 70 & \sum Y_1 &= 356 \\ N_1 &= 26 & \sum Y &= 1109 \\ N_0 &= 44 & \sum Y^2 &= 28,673 \\ & & (\sum Y)^2 &= 1,229,881 \end{aligned}$$

$$\underline{\underline{r_{pb} = -0.13}} \quad (\text{Critical value} = 0.25 \text{ for } p = .05, \text{ df} = 68)$$